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ABSTRACT

The speech of each of eight children aged 15 to 24 months was monitored in an informal setting and analyzed for the imitation of nonsense words introduced by the experimenter. In a second session, objects were introduced as referents for the nonsense words. Results failed to support the two initial hypotheses, namely that children imitate in part because the adult model contains phonological characteristics not yet incorporated in the infant's phonological system; and that a child's imitative utterances reflect phonological characteristics that overestimate the developmental level of the phonological system. The findings indicate that caution should be used in inferring selection patterns from data including imitative utterances, since selection constraints may relax in spontaneous speech and seem absent in imitation. The apparent relaxation of constraints may be facilitated by the demands of co-occurring developments in the child's lexical and semantic-syntactic acquisition. Children's imitations do not betray the phonological principles of the selection constraints still operating on their spontaneous speech in that they do not include consonants and syllabic shapes absent from the children's spontaneous usage. Exceptions to phonological patterns appear in imitative as well as spontaneous speech. (Author/JB)

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ASPECTS OF CHILD PHONOLOGY IN IMITATIVE AND SPONTANEOUS SPEECH

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Studies of child phonology have been faced with an important methodological question, to which an answer has not yet been determined. During the early period of linguistic development, the speech of many children includes utterances that represent imitations of an immediately prior adult utterance. Investigators have been uncertain whether or not to include such imitative utterances in corpora to be subjected to phonological analysis.

It seems that at least two reasonable hypotheses can be formulated regarding the phonological characteristics of young children's imitative utterances. The first hypothesis concerns the issue of why the child might imitate in the first place. Perhaps the child imitates in part BECAUSE the adult model contains phonological characteristics not yet incorporated in his phonological system. Such imitation might provide the child with some necessary familiarity with these phonological characteristics, thereby making this incorporation possible. Quite similar findings have been noted by Bloom, Hood, and Lightbown (1974) and Ramer (1976) with regard to lexical and semantic-syntactic structure characteristics. The young children studied by these investigators were found to imitate just those lexical items and semantic-syntactic structures that they had not yet used spontaneously. It seems reasonable to test the hypothesis that similar results might be found for linguistic characteristics of a phonological nature.

The second hypothesis concerns the relationship between the phonological characteristics of children's spontaneous and imitative utterances. The second hypothesis is that a child's imitative utterances may reflect phonological characteristics that overestimate the developmental level of his phonological system. However, unlike the first hypothesis, this hypothesis assumes that the child may imitate adult utterances without regard for their phonological characteristics. Thus, any selectivity seen in the child's imitations would be limited to factors of a nonphonological nature. Implicit in this hypothesis is the view that imitating under these circumstances may allow a circumvention of processing by the child's phonological system, reflecting more of a perceptual-motor (phonetic) activity than a rule-governed one.

The purpose of this investigation was to determine whether the first hypothesis may apply to phonological aspects of imitations as it apparently does to other linguistic aspects of imitations, or, alternatively, whether the second hypothesis more

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accurately portrays the correct state of affairs with regard to the relationship between phonological aspects of spontaneous and imitative utterances.

Method

Subjects

Eight children ranging in age from 15 to 24 months, served as subjects. The children's speech was limited to the use of single- and two-word utterances. An analysis of a sample of spontaneous speech obtained from each child revealed mean utterance lengths ranging from 1.00 to 1.40 morphemes. The morpheme counting conventions employed were adopted from Brown (1973). All of the children demonstrated speech at the level of early Stage I according to the Brown (1973) classification scheme. Each child performed within the normal range on the Cognitive Area of the Lexington Developmental Scale (1974).

Setting

In an attempt to provide a setting which resembled a home environment, the study took place in an experimental room which was designed to resemble a living room, equipped with carpeting, a sofa, coffee table, lamp, and several living room chairs. A video recording camera was mounted in one corner of the experimental room. This camera was operated via remote control in a video monitoring room on the same floor of the building. As a back-up to the video recording equipment, an audiotape recorder was also employed for its increased sensitivity to the phonetic details of the children's speech. The same set of children's picture books and toys were made available to all children.

Session 1: Spontaneous Sample

Each child was accompanied to the experimental room by his mother. After a few minutes of unstructured activity designed to allow the child to become comfortable in the room, a spontaneous sample ranging from 176 to 601 utterances was obtained from each child. The standard set of picture books and toys were made available to the children for this purpose.

The speech samples obtained from the children served two purposes. One purpose was to permit a determination of the general level of linguistic development at which a child was operating. Another purpose was to gather data to serve in a specification of the child's phonological characteristics. One of the experimenters in the experimental room during sampling phonetically transcribed each child's speech. A review of the audio recordings permitted a check of the live transcriptions and allowed the addition of utterances which were missed in the live

situation. When the experimenter was unsure of the referent of a particular child's utterance, the video recordings were reviewed. The resulting phonological characteristics served as the basis for the construction of the nonsense words used in the imitation task.

For each child, 24 nonsense words were constructed meeting the following specifications: (1) six nonsense words consisted of consonants that the child had incorporated in his phonology (e.g. t, p). In addition, the syllabic shape of these nonsense words (e.g. consonant-vowel-consonant-vowel, as in popo) represented a shape evidenced in the child's phonological system. (2) Six nonsense words consisted of consonants that were absent from the child's phonology (e.g. f, k). However, the syllabic shape of these words had been evidenced in his phonological system (as in koko). (3) Six nonsense words consisted of consonants evidenced in the child's system, although their syllabic shape had not been previously observed (e.g. vowel-consonant-vowel-consonant, as in otot). (4) The remaining six nonsense words consisted of consonants and syllabic shapes that were absent from the child's phonological system (e.g. okok). Consonants and syllabic shapes were deemed absent from the child's phonological system if they were not evidenced in the child's productions nor were characteristic of the adult words attempted by the child.

Session 2: Imitation Task

During the subsequent session, 24 stimulus objects were employed. These objects served as the referents for the 24 nonsense words. The objects were an Indian headress, some curved wire, a rubber drain stopper, a bug-shaped toy with wheels, a detached zipper, a metal clamp, a spring clip, a round and furry ball with eyes, a knife sheath, a protractor, a shower head, a toy rolling pin, a red die, a handlebar grip, an obscurely-shaped cookie cutter, a funnel, a detached belt buckle, a magnet, a suction soap holder. a detached handcuff, a sheriff's badge, a cork, a triangular sponge, and a wire whisk. All of these objects were unfamiliar to the children.

Each child was again accompanied by the mother for the second session, held approximately one week after the first session. After a few minutes of unstructured activities, the child was encouraged to play a 'game' by placing all objects presented to him in a paper container. In some instances the procedure was altered when the child showed a preference for handing the objects to the mother rather than placing them in the container. After the child demonstrated a willingness to participate with several familiar (nonexperimental) objects, the experimenter proceeded to hand him each experimental object. The presentation of each object was accompanied by the experimenter's use of the corresponding nonsense word in a stimulus utterance of the form Here's a _____ (e.g. tobo). The experimenter allowed the child approximately 10

seconds with each object before encouraging him to place it in the container. The order in which different objects were presented and the assignment of a particular nonsense word type to a particular referent object were randomized across children.

Analysis

Imitations in the imitation task were defined as the use of a nonsense word in such a way that it: (1) was produced after the stimulus utterance containing the nonsense word with no intervening utterance on the child's part, (2) was not accompanied by the use of words not contained in the stimulus utterance, (3) contained at least a consonant and a vowel to permit identification of the nonsense word in the stimulus utterance, and (4) occurred without the child being asked to imitate. Imitations were analyzed according to both selection constraints and production constraints. Selection constraints are those restrictions which the child imposes in choosing what words to imitate and what words not to imitate on the basis of their phonological characteristics. A production constraint was considered to be operating in any case where the child's imitation of a nonsense word was inaccurate with respect to the adult model in terms of consonants and/or syllabic shape. Production constraints, then, dealt with the child's accuracy in production once he had chosen to imitate a particular nonsense word.

Results and Discussion

The first analysis dealt with the selection restrictions involved in children's imitations. An analysis of variance was performed with the syllabic shape of the nonsense word (whether present or absent from the child's own phonological system) and the consonants in the nonsense word (present or absent from the child's system) serving as within-subject variables. These results indicated that the children's tendency to imitate did not vary as a function of whether or not the syllabic shape of the nonsense word was evidenced in their phonology, F (1, 7) = 1.07, $p > .05$. In addition, the children's tendency to imitate did not seem to be a function of whether or not the consonants of the nonsense words were incorporated in their phonological systems, F (1, 7) = 0.88, $p > .05$. No syllabic shape X consonant interaction was observed, F (1, 7) = 0.47, $p > .05$. A comparison of the means appearing in Table 1 suggests that the lack of significant differences was not attributable to restrictions in the range of possible imitations (0 to 6 possible within each of the four nonsense word types). Quite clearly, the first hypothesis was not supported by these results.

Table 1. Mean frequency of children's imitations

Syllabic shape present		Syllabic shape absent	
Conson present	Conson absent	Conson present	Conson absent
e.g. popo	e.g. fofo	e.g. otot	e.g. okok
3.50	3.00	3.63	3.63

These results speak to an important issue. Several recent investigations have observed a tendency in young children to select only certain words for usage while seemingly avoiding others (Ferguson, Peizer, & Weeks, 1973; Ferguson & Farwell, 1975; Vihman, 1976). This phenomenon is generally thought to be due in part to the enormity of the task set before the child of constructing within his own production capacity, the lexical items of the adult lexicon (Ferguson, 1976). The child presumably selects a few lexical types which serve as the basis of his production system and avoids attempting other kinds of lexical items. We did not observe this type of pattern in our imitation data. As seen in our rejection of the first hypothesis, selection restrictions were not operating to any significant degree on the children's imitations. Furthermore, for virtually all the children it was far more difficult to identify syllabic shapes and particularly consonants which were absent from the children's systems. This would suggest that selection and avoidance patterns may be relaxed significantly during this period, contrary to the more gradual progression suggested by Ferguson (1976) and others.

There is a plausible explanation for the infrequency of selection and avoidance patterns in our data. The children in this study seemed to have entered the period of particularly rapid lexical and semantic-syntactic development described by Ingram (1975) and others. All but one child were over 18 months of age, all had acquired at least 50 lexical items, and most had begun using two-word utterances. Not coincidentally this same period marks the point when children's imitations serve the function of introducing new lexical and semantic-syntactic features into their linguistic systems (Bloom, Hood, & Lightbown, 1974; Ramer, 1976). An efficient means by which children could focus adequate attention on these lexical and semantic-syntactic features without overloading their systems would be to simplify the processes involved with other features of language. In particular, children may relax their application of selection and avoidance rules in order to permit the acquisition and use of new lexical items and semantic-syntactic structures. To these features, children may simply apply some of the same consonants and syllabic shapes already within their phonological systems. In short, general simplification processes in child phonology may be prompted in part by the demands of acquiring a host of other linguistic features.

The nonsense words employed in the imitation task included words whose syllabic shapes and consonants were not evidenced in the children's spontaneous speech. Therefore a comparison of the

production constraints involved in the children's imitations of these nonsense words with those involved in their imitations of the remaining nonsense words could serve to determine whether children's imitations would be phonologically in advance of, or phonologically similar to their spontaneous speech.

The nonsense words containing syllabic shapes not used in the children's spontaneous speech were imitated with a higher percentage of syllabic shape constraints than the nonsense words containing syllabic shapes that were used by the children spontaneously, F (1, 7) = 15.12, $p < .01$. Further, these syllabic shape constraints did not appear to relate to whether or not the words being imitated contained consonants evidenced in the children's phonological systems, F (1, 7) = 3.73, $p > .05$. These results are summarized in Table 2.

Table 2. Mean frequency and percentage (in parentheses) of accurate syllabic shape productions in the children's imitations, classified according to whether the consonants and syllabic shapes of the nonsense words were present in or absent from their spontaneous speech.

Syllabic shape present		Syllabic shape absent	
Conson present	Conson absent	Conson present	Conson absent
3.25 (92.85%)	2.00 (66.67%)	1.00 (27.55%)	1.00 (27.55%)

With regard to consonants, the nonsense words containing consonants not used in the children's speech were imitated with a higher percentage of consonant constraints than the nonsense words containing consonants that were used in the children's spontaneous speech, F (1, 7) = 21.46, $p < .005$. The consonant constraints did not vary as a function of the type of syllabic shape involved, F (1, 7) = 2.46, $p > .05$. These results are summarized in Table 3. Thus, the findings for the production constraints operating on both the syllabic shapes and consonants used in the children's imitations argue against the second hypothesis.

Table 3. Mean frequency and percentage (in parentheses) of accurate consonant productions in the children's imitations, classified according to whether the consonants and syllabic shapes of the nonsense words were present in or absent from their spontaneous speech.

Syllabic shape present		Syllabic shape absent	
Conson present	Conson absent	Conson present	Conson absent
2.63 (75.14%)	0.75 (25.00%)	2.25 (61.98%)	0.63 (17.36%)

These results are illuminating from several perspectives. They suggest that when young children imitate in an unsolicited fashion, the characteristics of the consonants and syllabic shapes in these imitations do not vary to any significant degree from the phonological characteristics of their spontaneous speech. This state of affairs offers considerable methodological advantages. It suggests that the inclusion of imitative utterances of this

sort as data for phonological analyses of production characteristics (cf. Ferguson & Farwell, 1975; Edwards & Garnica, 1973) may be a proper undertaking. This is no small benefit; unsolicited imitations may constitute up to 51% of children's utterances during this period of linguistic development (Ryan, 1973). As noted by Ferguson and Farwell, if only purely spontaneous utterances were included for analysis, severe limitations would be placed on the scope of the phonological data obtained. A related benefit would accrue in more experimentally-oriented studies. For example, recent attempts to compare young children's perception and production of various phonological features (e.g. Edwards, 1974) may appropriately employ unsolicited imitation tasks to obtain production data under more controlled conditions.

It should be noted that although the second hypothesis was rejected, some consonants and syllabic shapes not seen in the children's spontaneous speech were evidenced in their imitations (see Tables 3 and 4). Similar observations have recently been made by Shibamoto and Olmsted (in press). There seem to be at least two explanations for these instances. First, the original designation of certain consonants or syllabic shapes as being absent from a child's phonological system may have been based on a limited number of instances in the sample in which a constraint was operating on the consonants or shape. That is, the limit of the sample size may have been responsible for an erroneous judgment that a particular shape or consonant was absent from the child's phonological system. However, there is evidence which argues against this possibility. If the children did select or produce the consonants and shapes deemed out of their systems, but did so only in a few unobserved instances, then sample size should serve as a good predictor of the degree to which the children were found to imitate these in the imitation task. That is, the larger the sample size, the greater the opportunity of observing infrequent usage of a consonant or syllabic shape, thus avoiding an inappropriate assignment to the 'out of the system' category. However, rank order correlations between speech sample size and degree of imitations of both consonants, $r = .01$, $p > .05$, and syllabic shapes, $r = .24$, $p > .05$, thought to be absent from the children's phonological systems proved nonsignificant. Although a few consonants or syllabic shapes may have been erroneously categorized at the onset, it is doubtful that they represented the majority of those imitated during the imitation task.

Another possibility is that some of the nonsense words in the imitation task were treated by the children as exceptions to the rules constraining the production of certain consonants and syllabic shapes. These seem analogous to the progressive phonological idioms described by Leopold (1949), Ferguson and Farwell (1975) and others. In our study, there were a few instances when, after imitating a nonsense word, the child turned

and handed the referent object to the mother, naming it as he presented the object. In nearly half of these instances, the child's production changed, seemingly in a direction more consistent with the production constraints operating on his spontaneous speech. The following examples are representative.

(1) (Experimenter hands object to David)
Here's an adʒadʒ — adʒə
(David turns to mother) — adə

(2) (Experimenter hands object to Gil)
Here's a ʃoʊz
(Gil walks over to mother with object) — ʃotˢ / ʃotˢ

It is not clear that these examples actually represent phonological idioms at 'high speed.' Like phonological idioms though, the subsequent production of these nonsense words took a more simplified form consistent with the children's phonological systems and, like phonological idioms, they constitute evidence that children's production constraints are not passively determined by inadequate perception or immature motor abilities.

Several conclusions emerge from this study. The findings indicate that caution should be taken in inferring selection patterns from data including imitative utterances, particularly for the period of linguistic development considered here. During this period, selection constraints may relax somewhat in spontaneous speech and seem absent in imitation. We speculate that the apparent relaxation of these constraints is facilitated by the demands of co-occurring developments in the child's lexical and semantic-syntactic aquisition. Children's imitations do not betray the phonological principles of the selection constraints still operating on their spontaneous speech in that they do not include consonants and syllabic shapes absent from the children's spontaneous usage. It seems proper, then, to include imitations at least in studies examining children's inventories of syllabic shapes and consonants. Finally, exceptions to phonological patterns appear in imitative speech as they do in spontaneous speech, providing further evidence that children play an active part in arriving at a phonological organization for the language they are learning.

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